## Space Weather Forecast

Issued on Monday, 09 January 2023 at 01:07 Local

**This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales**

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**Space Weather Forecast Headline: Moderate solar activity likely, slight chance of Strong solar activity throughout.**

**Analysis of Space Weather Activity over past 24 hours**

**Solar Activity:** Solar activity has been Moderate, with four Moderate-class flares observed, all originating from the newly emerging sunspot region, which is now just visible on the southeast limb. This region also produced a coronal mass ejection (CME), which is currently being analysed, although unlikely to be Earth-directed due to its location. There are currently six sunspot regions on the visible disc, of which the region in the southeast is the largest and most complex. Significantly though, the largest flares over the past 24 hours, were two M1.4 observed at 08/0948 UTC and 08/1507 UTC, both originated from the sunspot region which has recently emerged on the southeast limb. No Earth-directed Coronal Mass Ejections (CMEs) have been observed in the past 24 hours.

**Solar Wind / Geomagnetic Activity**: Solar winds were at slightly elevated levels, averaging around 430 km/s. Total Interplanetary Magnetic Field was mostly weak, with the north-south component also varying weakly. Geomagnetic activity was Quiet (Kp 0-2).

**Energetic Particles / Solar Radiation:** The count rate of energetic particles (high energy protons) was at background levels with no solar radiation storms occurring.

**Four-Day Space Weather Forecast Summary**

**Solar Activity:** Solar activity is likely to be Low to Moderate, with a slight chance of becoming High from any Strong flares through the forecast period, these most likely from the largest region on the disc, or the new region that is about to emerge.

**Solar Wind / Geomagnetic Activity:** No Earth directed CMEs are currently expected. Solar wind speeds are slightly elevated at the moment, and are expected to decline through Day 1 (09 Jan), probably to near background levels. The next feature of interest is another coronal hole fast wind, which is likely to arrive either at the end of Day 1 (09 Jan), or more likely on Day 2 (10 Jan). Geomagnetic activity is expected to be mostly Quiet at first, increasing with the fast wind arrival either later on Day 1 (09 Jan) or on Day 2 (10 Jan) to become Unsettled to Active, with a slight chance of a G1/Minor Storm. Activity then slowly declining through Days 3 and 4 (11-12 Jan).

**Energetic Particles / Solar Radiation:** The count rate of energetic particles (high energy protons) is likely to remain at background levels. However, there is a risk of an increase should any significant flares occur, giving a slight chance of exceeding the S1/Minor Storm threshold.

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# Met Office Space Weather Forecast

**Geomagnetic Storms:**

| Geo-Magnetic Storm Probability (Exceedance) | Level | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Minor or Moderate | G1 to G2 | No | 5 | 20 | 5 | 1 |
| Strong | G3 | No | 1 | 1 | 1 | 1 |
| Severe | G4 | No | 1 | 1 | 1 | 1 |
| Extreme | G5 | No | 1 | 1 | 1 | 1 |

**Radio Blackouts - X Ray Flares:**

| X Ray Flares Probability | Level | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Active | R1-R2 M Class | Yes | 60 | 60 | 60 | 60 |
| Very Active | R3 to R5 X | No | 20 | 20 | 20 | 20 |

**Solar Radiation Storms - (High Energy Protons):**

| Radiation Storms Probability (Exceedance) | Level ($cm^{-2}$ $sr^{-1}$ $s^{-1}$) | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Active | ≥ S1 | No | 15 | 20 | 20 | 20 |
| Very Active | ≥ S3 * | No | 1 | 1 | 1 | 1 |

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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